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predictive value of these equations is quite independent of the assumptions upon which they were originally based.

This investigation of fundamental life processes shows that they appear to obey the laws of chemical dynamics. It illustrates a method of attack which may throw some light upon the underlying mechanism of these processes and assist materially in the analysis and control of life-phenomena.

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### ISAO IIJIMA

PROFESSOR ISAO IIJIMA, head of the department of zoology in the Imperial University, died of apoplexy at his home in Tokyo on March 14. His father, a Samurai of the Daimyo Inouyé of Shizuoka, was one of those devoted to foreign learning in the decades before the restoration: proceeding to Nagasaki, he studied European ideas through the medium of the Dutch language—later suffering imprisonment on account of these interdicted studies. The son Isao, born Bunkyunin (1860), followed the father's footsteps, was early a student of foreign languages and science, and was eager to master physiology and anatomy. So he found his way presently to the Imperial University of Tokyo, which then was beginning its famous career. Here he came under the guidance of the American zoologist, Professor Edward S. Morse, whose inspiration soon turned him from medical studies to pure science. Thereafter he went to Leipsic, where he took his doctorate with Professor Leuckart. Returning to Japan about 1885, he was appointed a member of the faculty of the Imperial University, where he was to remain until the day of his death; in the last years he was also professor in zoology at the Nobles' College, Tokyo. Foreign zoologists will always remember Iijima, side by side with Kakichi Mitsukuri, as taking foremost and genial place in all zoological matters in Japan. His knowledge of the general subject was unusually wide: a fluent lecturer, an attractive personality, he

popularized zoology and brought help to it from many sides; for not only was he the trained morphologist, but the old school naturalist as well, bird expert notably, having among his friends collectors and gunners in all part of Japan; his hobby took him everywhere, and as a good shot he was as welcome in the hunting parties of the Emperor as with the pheasant-stalking peasants on the hillside near Misaki—where for many years he spent his summers. Here was the seaside laboratory of his zoological department, and offshore were the great depths of Okinose (6,000 meters) from which many a red-turbaned fisherman, and Kuma Aoki especially, brought him the rarest of glass-sponges. These Iijima made his life-long study: and he dealt with them in memoirs which, published in the main in the *Journal of the Science College*, are classics, indeed—though Iijima himself would be apt to add, in his joking way, that this was not as great a feat as it seemed, since he was the only life-long specialist in the field! In point of fact, these sponges were poorly represented throughout the world (large museums had sometimes not more than a few small specimens—usually a ragged Hyalonema, or a defective Venus-basket), till the discovery was made of many species, genera, and even families of them in Iijima's district of the Pacific where nature seemed to have taken many pains to keep them alive in an early geological "garden."

In a practical direction Iijima's studies carried him to the culture of "artificial" pearls, and several of his students, the late Dr. Nishikawa especially, developed this industry with great success—having devised new modes of causing the pearl oyster to produce hemispherical, more-than-hemispherical, and in the latest time completely spherical pearls.

BASHFORD DEAN

### SCIENTIFIC EVENTS

#### EX-SECRETARY MEREDITH ON RESEARCH

(From a correspondent)

THE organization of research is now receiving so much attention that the fear is ex-

pressed that more fundamental considerations are being overlooked. The words of Edwin T. Meredith, former Secretary of Agriculture, may, then, serve as a timely warning. In a statement published under the title "My Year in the Department," in the *Country Gentleman* for February 26, 1921, he points out as requisite for the successful prosecution of research in a large organization these fundamentals: Securing the right kind of men; providing them with adequate appropriations for research; freeing them from irksome restrictions in the expenditure of those funds; and providing for adequate publication of their results. That Mr. Meredith speaks with full appreciation of the importance of research, is shown by his administration and by its straightforward statement in the same article.

Research is the foundation of agricultural progress. Without it most of our agricultural activities could not exist. Our most important methods are based on the results of years of patient investigation. There is no real progress without scientific study applied to everyday problems. So much had been accomplished through research that many people may fall into the error of thinking that not much more work of this character is needed and that the requirements of the day relate merely to the application of knowledge already in hand. Research is more essential now than ever before, and the need does not relate wholly to taking care of the future. We are confronted today with serious problems of the most pressing nature, about which we know very little. . . .

Without minimizing in any degree any of the activities of the department or the other suggestions that have been made for strengthening certain features of the work, I place particular emphasis at this time on the importance of personnel, the value of research and the need of the most intensive study possible of marketing problems.

I place the problem of personnel first. It is the corner stone, you might say, of the whole structure. To secure the right kind of men the department must be able to pay higher salaries, and it must be free from some of the limitations which are now imposed on the expenditure of its appropriations. I am not decrying legal safeguards, which always must be imposed on the expenditure of public money, but I do deplore unnecessary re-

strictions which result in subordinating good judgment and business-like management to routine and fiscal control.

Appropriations for research are the equipment of the worker, and unless he is properly equipped he can not be expected to get results. And in this connection I regard, as a part of his equipment, funds for publishing the results of his work. Nothing is more discouraging to a scientific worker than to be denied the right to publish the facts he has learned after years of patient investigation.

So much has been written recently of the alleged inefficiency of government workers that it is inspiring to hear, from an executive officer on the eve of his retirement, a quite different statement.

The work of the department, taking it all the way through, is done by as earnest and as able a lot of men and women as any with whom I have ever come in contact. On the whole, they work as many hours a day and as efficiently, I believe, as employees in most private establishments, and they are paid less. Large numbers of them are held to their work by their love for it. Many formerly with the department were offered so much more money in private employment that, in justice to themselves and their families, they could not refuse to go.

In a single year 8,000 of these workers left the department. Those who left last year received from private concerns and other institutions an average increase in salary of more than 50 per cent.; and there are instances of increases running as high as 500 per cent. If the men and women in the department were not efficient private industry would not be offering them such increases in salary. Those remaining are as efficient as those who have gone, and many of them have declined just as tempting offers. They have said in spite of low salaries and high living costs they are going to stay where they render the greatest service to the nation.

#### SCIENTIFIC LEGISLATION

THE *Journal* of the Washington Academy of Sciences notes the following matters of scientific interest in the third session of the Sixty-sixth Congress convened on December 6, 1920:

Under a special rule adopted on December 14, the joint resolution (S.J. 191) to create a